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Aspects of the structural evolution of Balchenfjella, East Sør-Rondane, Antarctica and its Gondwana context.

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The Balchenfjella occupy the eastern end of the Sør Rondane mountains in E. Antarctica. The only previous study of the geology of the area is that of Asami et al. (1991). New data collected during JARE51 show that, in contrast to the relatively simple structural evolution reported by Asami et al., (1991), the structural evolution of Balchenfjella is more complex and similar to that reported for W. Sør Rondane by Osanai et al., (1996). Early deformation phases D1 and D2 are recognized, locally forming type 3 interference folds. At rare localities the interference structures are cut by younger thrust-fault? planes which locally transect the banding but are dominantly layer parallel and recognized only locally.

Rocks with near vertical fabrics are restricted to extensive but localized areas and have strong planar compositional banding and fabrics typical of high strain shear. Lineations are not well developed suggesting either post-tectonic retrogressive re-crystallisation or that the strain was of a more flattening pure shear nature. Kinematic indicators are sparse due to the lack of lineations and comprise drag folds and planar discordancies. The planar discordancies are frequently filled by thin melt layers with shear fabrics indicating high temperature shearing assisted by melt lubrication.

The compositions of the gneisses vary widely and include quartzofeldspathic biotite hornblende gneiss, amphibolite, meta-carbonates, metapelites as well as ultramafic rocks. The latter typically form cm scale to >100m sized boudins. The strongly banded gneisses were termed by Asami et al. (1991) as stromatic migmatites however they show no anatectic textures. Therefore their compositional variation is inferred as resulting from strong tectonic shear mixing. Other areas mapped by Asami et al., (1991) as migmatites are characterized by lower strain in which partial melt textures typical of hydrous as well as vapour absent melting are preserved, In addition many phases of intrusion can be identified in the lower strain areas. The intrusive phases include felsic veins, mesocratic intermediate veins, possible lamproitic and basic compositions. The leucosome/melanosome relationships appear to be overprinted and destroyed in the high strain zones resulting in increased compositional banding. The high strain zones are also retrogressed with some rocks containing relict garnet porphyroblasts now partially to completely replaced by biotite.

Comparison of the lithology, geochronology, petrology and structural evolution support correlation of Sør Rondane with rocks in N. Mozambique, within and north of the Lurio Belt.

References

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